Overview of Neutrino Factory Study 2a

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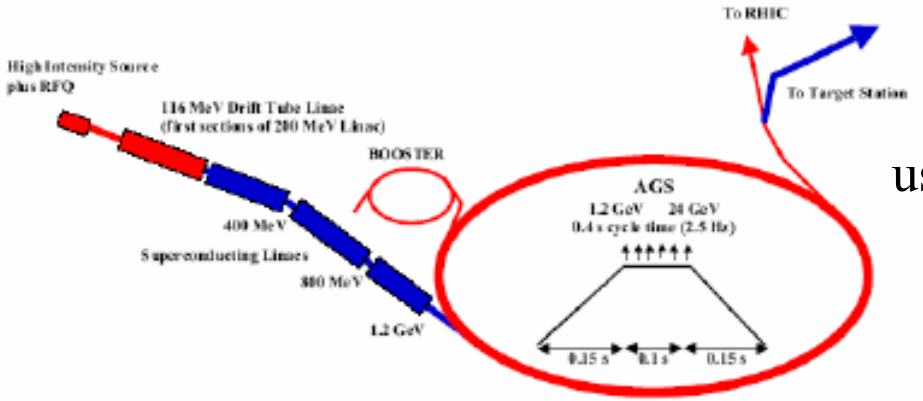
Study 2a

- Study 2a = design written up in APS Joint Study on the Future of Neutrino Physics (2004)
- this is an update on NFMCC Neutrino Factory Study 2 (2001) contained some BNL site-specific aspects
- new front end design
  - adiabatic RF bunching and phase rotation
  - simplified cooling channel
- new accelerator design with A_T = 30 mm rad
  - dog-bone RLA
  - FFAG accelerators
- Study 2b = design written up in PRSTAB **9**,011001 (2006)

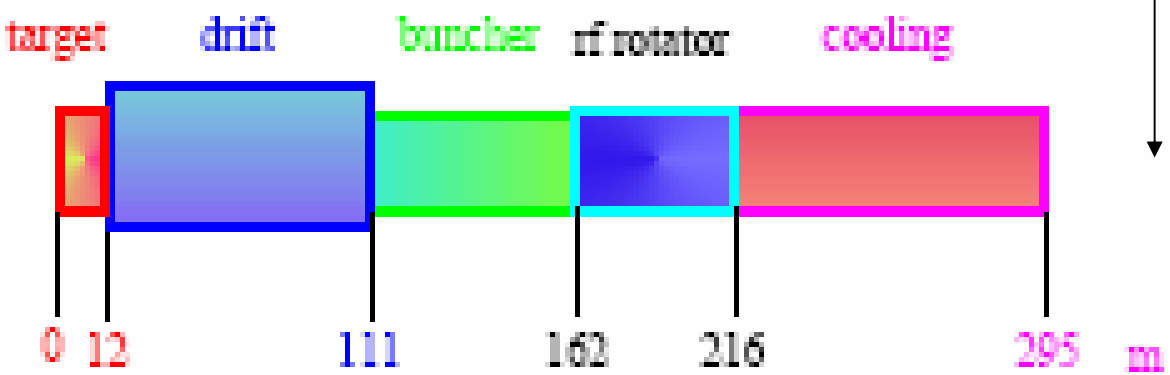
Study 2a Layout (1)



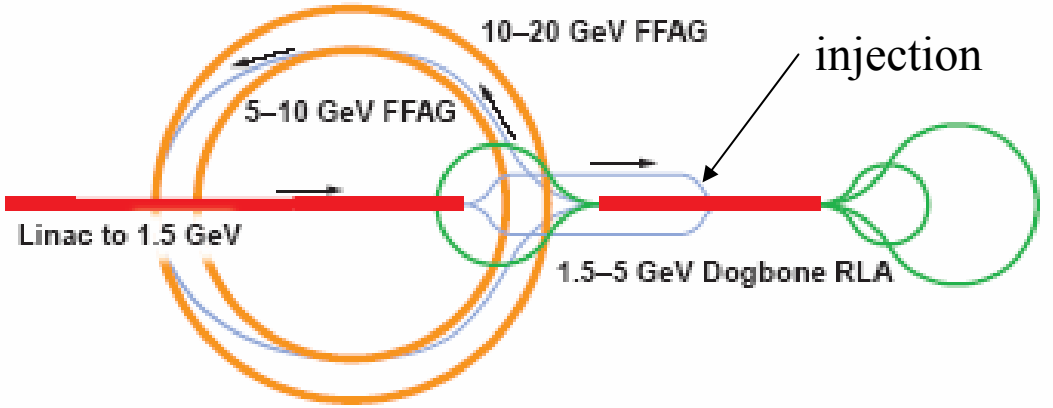
used upgraded AGS as proton driver

15 m matching section

Hg target in 20 T



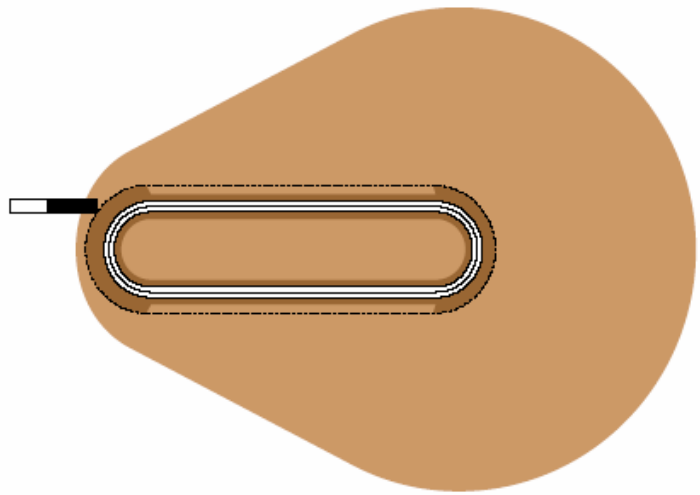
Study 2a Layout (2)



131 m

302 m ~350 m

(could be partially overlapped)



very small racetrack
for site-specific reasons
126 m straights

ISS (possible changes in the wind)

- proton beam power: 1 → 4 MW
- proton beam energy: 24 → 10 GeV
- proton pulse width: 3 → 1 ns
- target: mercury → carbon?
- final muon energy: 20 → 30-40 GeV
- storage ring configuration: racetrack → triangle
  racetrack much larger than Study 2a
  e.g. 496 m straights for 20 – 50 GeV ring

Study 2a proton driver parameters

• total beam power	1 MW	
• beam energy	24 GeV	
• cycle time	400 ms	
• protons per fill	$1\ 10^{14}$	
• bunches per fill	6	
• protons per bunch	$1.7\ 10^{13}$	
• time between bunches	20 ms	(Hg jet)
• bunch length at extraction	3 ns	

Some downstream issues

- 8 GeV and >1 MW means more μ per second
- carbon target constraints?
- beam loading in rf cavities
- heating in absorbers & windows